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John Cleeves
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Subject: Upper Chattooga River Phase I Data Collection Expert Panel Field Assessment Report

Dear Mr. Cleeves:

I am a water resources manager employed by ENSR Corporation with broad experience in managing recreational waters. This experience has included evaluation and regulation of boat traffic, fishing conditions, and water quality as relates to recreational uses. I have been involved in studies of the recreational carrying capacity of lakes and rivers, impacts of boating on the aquatic environment and other users, potential improvement of streams for recreational uses, and minimum flows for a variety of uses, particularly habitat maintenance. I work extensively with user groups, many with clear conflicts with other users, in both public and private settings, seeking rational management approaches.

ENSR was hired by a private client in North Carolina to review work relating to the potential impacts of opening the upper Chattooga River to boating. To this end, the February 2007 report by the Louis Berger Group entitled "Upper Chattooga River Phase I Data Collection Expert Panel Field Assessment Report" and related methodological documents were reviewed. I also went to the upper Chattooga River and spent considerable time in, on and near portions of the river to become familiar with conditions.

This letter addresses the validity and utility of the Upper Chattooga River Phase I Data Collection Expert Panel Field Assessment Report published February 2007 by the Louis Berger Group. While recreation science often involves accumulating subjective opinions to arrive at an overall evaluation of the suitability of an area or set of conditions for an activity, there are procedures generally applied to limit bias or at least to characterize it. Aspects of the study design, implementation, results and conclusions are overly biased and flawed in this case. According to the authors, "The purpose of the expert panel assessment was to gain information about boating and angling opportunities on the upper Chattooga River, with particular attention to boaters and anglers flow preferences for these flow-dependent activities." By assessing conditions at only one flow and considering only the most rudimentary aspects of the recreational experience, it misses this target substantially.

This report is one component of a larger analysis being conducted by the United States Forest Service (USFS), so there is opportunity for the USFS to recognize this and either rectify the shortcomings or disregard questionable conclusions. Please consider the following issues.

Criteria For Member Panel Selection

The selection process to choose panel members to participate in the flow study seems biased towards getting boaters with more experience, skill and inclination to find the conditions suitable. The panel members were selected based on "...the review of the following qualifications: years of experience, skill level, previous experience participating in flow studies, level of availability, and knowledge of the area and/or river." One requirement of the boater panel members was experience in Class V whitewater (expert boaters). Angler panel members needed only have experience in a full range of angling techniques, but no documented skill level or experience with this river or similar conditions. In essence, members of the angler panel were not required to be experts in the field of fishing, whereas the boating panel members were clearly expert paddlers.

Limiting the panel members to those with Class V whitewater experience immediately eliminates the majority of potential boating/rafting users on the upper Chattooga River. Novices or even advanced kayakers and below were not able to participate on the expert panel, so all thoughts, opinions and results of the panel are going to relate to expert kayakers only. We recognize that there are safety issues involved with participant selection, however, it must be acknowledged that no viewpoint on boatability by amateur, beginner, moderate or even advanced kayakers is supplied. Would any opening of the upper Chattooga River to boating be limited to those with some documented minimum skill level? Would the river be open to boating only on selected days when conditions were deemed appropriate? Who would make those determinations? Management policy cannot ignore the potential risks and associated liabilities associated with every potential user on both private and public lands.

It is our understanding that boating panelists were members of the American Whitewater Association (AWA), a group that has publicly pushed for opening the upper Chattooga River. This does not foster an unbiased analysis. In contrast, the criteria for selection for the fishing panel do not preclude a range of panelists with different backgrounds. However, it does not appear that familiarity with the entire target reach of the river was sought in the fishing panel; for certain, no member of the existing outing club utilizing the Chattooga Cliffs section of the river was included. This may seem like an effort to avoid bias from a group with a vested interest in keeping boating off this river segment, but limits the expertise and coverage on the fishing panel. It is surprising that no effort was made to at least acquire data from individuals or groups that routinely fish this river as such use is already permitted.

The consultants that conducted the boatability and fishability study as sub-contractors to the Louis Berger Group (Whittaker and Shelby) were apparently recommended by the AWA, and correspondence indicates that the AWA was accorded some form of review in the selection of panelists. It would not be unusual for a group such as AWA to hire a consultant or develop a review team to provide support for its opinion, but it is not appropriate for an interest group to

guide the selection process for a publicly funded study to determine USFS policy on appropriate public uses. How much influence did AWA have in the selection of the consultant team and the panel members? Were panelist opinions influenced by AWA? Was input sought from other interest groups?

River Segment Selection

For the purpose of the Phase I study, the Chattooga River was separated into three sections based primarily on access locations to deploy and retrieve the panel members. Boating panel members planned to float the entirety of each section while fishing panel members were only able to experience a very limited area along each reach due to time constraints imposed by the study. Specific study zones were not selected based on conditions or physical attributes considered favorable or unfavorable to fishing. Instead, the members of the fishing panel were asked to use the same stretches of river that had been selected based on the preferences of the boating panel. These areas may not reflect the appropriate river delineation based on river morphology, fishing preferences or opportunities.

Access and boatability are the primary issues for the boaters; certainly scenic aspects and whitewater challenges figure into opinions, but the key aspect of boatability is the ability to move between access points. Fishing acceptability is far more complicated, and involves a number of factors for which evaluation was not facilitated by this study. The sub-consultants to the Louis Berger Group who conducted the boatability and fishability assessments are also authors of recreational study manuals (e.g., Whittaker et al. 1993, 2005) that point out the difficulty in assessing those many factors for fishability. However, ignoring them because they are difficult to assess is not acceptable in this process. Even narrowing the focus to access and flow related factors, fishing panel members should have been given the opportunity to assess conditions over a larger reach of river offering more varied conditions, and could have considered additional access points, as hauling equipment is less of a problem for anglers than boaters.

Study Approach

<u>Boatability</u>
The report does not include adequate discussion on the methods used to assess boatability. Specifically, no information is included on the number of hits, stops, drags or portages that are acceptable for any of the studied sections. The ranges and averages for these variables are provided, but there is no clear discussion of how these data were used. It appears that no pre-determined objective criteria were used to assess boatability. According to Whittaker et al. (1993), writing on the assessment of boatability, "...studies should systematically define the nature of problems as well as the number of such problems users will tolerate for various types of experiences." What was the tolerance level of the boating panel? Is the tolerance level of the expert boating panel likely to be similar to that of novices who could boat this section of river if opened to the public for such use?

Assessment of boatability also varies between craft type, yet only kayaks and a single canoe were used in this assessment. Is it to be assumed that if the upper Chattooga River was opened to boating, the types of craft would be specifically limited? Whittaker et al. (1993) state, "Relationships between flows and boatability will differ for different types of craft with different loads, and studies need to explicitly define any assumptions in this regard." No such assumptions appear to have been defined in this study, and the consultants appear to violate many of their own recommendations for proper assessment.

On the topic of boater skill level, Whittaker et al. (1993) state that "Flow-boatability relationships will differ for boaters with different skill levels, and studies need to state any assumptions about this variable." The authors of the Phase I report do not discuss the basic and inherent assumptions of the study. Clearly boatability is being based on a single trip by a group of expert kayakers and one canoeist, taken at a time when the flow was most conducive to that trip. Can one infer from successful completion of that trip that the river is suitable for boating at a level that warrants opening it to the public for boating? Note that Whittaker et al. (1993) described boating some stretches of some rivers as "... more like stunts than a recreation experience." While Whittaker et al. referred specifically to low water conditions in that report, the same could apply to rare high water conditions requiring extreme skill to successfully complete. Any conclusion that the entire upper Chattooga River could be opened to boating because a group of expert kayakers can make it through a selected portion of the river at a rare flow is unjustified.

"Boatability is an attribute directly affected by flow" (Whittaker et al. 1993), and the lack of a dam or other flow control structure makes it impossible for the consultants to control conditions. Given that the flow varies considerably over the upper Chattooga River, assessment of boatability will be complicated and limited by the pattern of natural flows and the timing of field assessments. There are no upstream dams that allow flow control for comparative analysis by the panel; this study depended upon a single assessment trip at a naturally elevated flow, with extrapolation to any other condition or un-assessed river segment.

With only one field assessment of selected portions of the target river reach, the utility of the results will be severely limited. For example, the upper 2.2 miles of the roughly 5.3-mile long Chattooga Cliffs section does not appear to have been floated in the assessment of the Chattooga Cliffs river reach. This upstream portion has much less flow than the downstream portion studied, with major confluences near where the boating panel began its run. Extrapolation of results from the lower portion (Mills Creek to Bull Pen Bridge) to the upper portion will be highly erroneous; the upstream section will be much less boatable for any given level of flow than the downstream portion. The situation is similar in other sections of the upper Chattooga River; conditions may vary markedly over a short distance as a result of tributary confluences. A field visit in November of 2006 supports this contention.

Lack of control over flows creates lack of predictability for boating conditions. Even if some portion of the target area is deemed boatable under some naturally occurring flow, knowing

when it will be boatable with enough notice to take advantage of it will be difficult. Offering recreational opportunity for boating under uncontrolled flow conditions creates many potential hazards for both boaters and the environment. Assuming that some portion of the target area is boatable by a select few under rare conditions on short notice is an entirely inadequate justification for opening an area to the public for boating at times of public choice.

Fishability

The term fishability is not defined in the Phase I report. According to Whittaker et al. (1993), "...fishability refers to the combination of conditions that provide a good fishing opportunity, including all the factors listed above." The factors to which the authors refer include access, water clarity, presence of various mesohabitats, and fish activity. A more recent document states that "Fishability studies only address immediate effects that anglers can evaluate, they do not provide information about immediate or long-term biophysical effects (Whittaker et al. 2005)." Biophysical effects in this reference include mainly features of the fish population. In some studies the use of pre-evaluation focus groups allows anglers to concentrate their efforts on two aspects of fishing, "...access to fishable water (wading, from the bank, or by boat) and use of fishable water (tackle and technique considerations)" (Whittaker et al. 2005). General goals of the fishing panel are supplied in the report, but there is no discussion of exactly what the authors were trying to assess during the fishability portion of the study. We would submit that even ignoring the factors Whittaker et al. find difficult to assess, a much better job could have been done evaluating the impacts of scenery, solitude, and related features of a fishing trip that make it special. Fishing is most definitely not just about access and flow considerations.

The members of the fishing panel were not given adequate time to fish any of the three pre-selected study sections. According to written reports supplied by the fishermen, the time allotted each day to fish depended on the amount of time the consultants spent with the boating panel. The focus on boatability to the detriment of proper assessment of fishability is evident.

No one from the fishing panel actually fished in the Chattooga Cliffs section of the river, although one fisherman did acknowledge that fishing was possible based on a short reconnaissance trip while waiting for the boating panel to arrive from upstream. No valid conclusions can be drawn about the Chattooga Cliffs section of the river during the survey except that it was fishable based on brief visual inspections.

Fishing in the Ellicott Rock reach was limited to 45 minutes due to the unexpected length of time for the boating panel to float the Chattooga Cliffs section. Ellicott Rock reach is a 5.3 mile section of the Chattooga River and it is difficult to believe that anyone could assess a 5.3 mile section of river in a meaningful way in 45 minutes. The fishermen could not even walk this section in the time allotted to them for fishing it. The lack of time allotted for fishing stands in contrast with the admonition of Whittaker et al. (2005), who suggest "It is challenging to assess a diversity of potential fishing locations during a short assessment period (a few hours

or a day)." Assessment periods were completely inadequate in the fishing portion of this study.

Another disturbing aspect of the Phase I fishability report is the range of flows applied to the fishability evaluation. The authors stated that "Most anglers are 'calibrated' to stage levels at the Highway 76 gage..." They also stated that the "boater panel, in contrast, made their evaluations relative to the Burrells Ford gage..." Flows in the upper reaches of the Chattooga River have not been correlated to the levels at the Highway 76 gage, so it is unclear how the authors are supplying recommended flows for fishing. The authors state that "...flows at the Highway 76 gage and Burrells Ford gage are not necessarily easy to 'convert'..." If there is no way to convert flows from the Highway 76 gage to the Burrells Ford gage with any confidence, how are the authors able to supply flow recommendations for the angler panel members based solely on the Highway 76 gage? Anglers were fishing upstream in the same areas the boating panel was boating, so why apply data from different gages?

Even under known flows, single flow assessments are noted as "...unlikely to provide precise flow ranges for different opportunities" (Whittaker et al. 2005). The limitation of this study in this regard casts great doubt on conclusions drawn from it. While it may be possible to establish some sense of applicable flow range from a single outing, the confidence interval surrounding such an estimate is expected to be too large for use in such a critical determination of recreational suitability. Put simply, not enough work has been done to support meaningful conclusions.

It appears that the focus of the angler panel evaluation was the quality of access to fishable water on the days of the study. Whittaker et al. (2005) state that in lieu of a controlled observational study, real data for use of a specific reach can be used to assess access and fishability. For the Chattooga Cliffs section, such data exist from the Whiteside Cove Association logbook previously submitted to the Forest Service that gives fishing dates and corresponding water levels since 1962. These data provide valuable input to answer the question of whether the Chattooga Cliffs area is fishable under a wide range of flows. Certainly there are other anglers who frequent other portions of the upper Chattooga River who could have provided useful input. Why bring in fishermen unfamiliar with this portion of the river and give them inadequate time to actually assess fishability?

The Louis Berger Group study concludes that the upper Chattooga River was fishable during the two-day study period, but may not have been optimal at the elevated flows encountered. The challenge is to create a distribution of fishability over the range of potential flows for all segments within the target reach of the river and compare that to a similar distribution of boatability. The study did not generate adequate data to derive such a distribution, and must conclude that fishing and boating activities will overlap in time and space. Historical records and my site visit indicate that fishing opportunities will exist over the range of natural flows. Angler preference for any given area will change as flows change, but the opportunity to fish under favorable conditions still exists. As noted previously, aspects of fishability extend beyond the quantitative level of fishing success, and access is sufficient to allow fishing at a

very wide range of flows. Unlike boaters, fishermen do not need an extended area of river to enjoy their recreational pursuit, and with less equipment to transport, can access points more readily.

Fishability vs. Boatability

The impacts of boating on fishing in the Chattooga River have not been addressed by the authors of the Phase I report. Human-related fishing impacts are detailed in the scientific literature, and failure to consider them in the overall assessment is a major shortcoming. Boat-related effects on fish and fishing are most often related to motorized boats and prolonged exposures. Non-motorized boats present a different type of impact on the fish community, one that is less often studied but still important in cases such as this one. Impacts from non-motorized boats include increased noise and disturbance through boat hits, stops and drags, increased noise from paddle strikes on the boat and river bottom, increased noise from talking and yelling, increased overhead shadows, and competition for habitat (human vs. fish). Additionally, desire to make boating more enjoyable may lead to intentional habitat alterations detrimental to fish and fishing, but we will focus on the direct impact of boating here.

Sudden, loud noises associated with boating (paddles, yelling, boats hitting bottom) will cause fish to momentarily seek shelter as far away from the noise as possible. Laboratory experiments have demonstrated fish reactions to sudden loud noises. Juvenile Chinook salmon and rainbow trout exhibited a strong flight response in relation to loud noise created by an aluminum tube and motorized piston. After multiple tests, the flight response was replaced by the fish moving as far away from the noise source as possible (Knudsen et al. 1997). Two additional laboratory studies reported that fish exhibited fright response and arousal from aquarium tapping and/or moving shadows (Laming and Ebbesson 1984; Laming 1987). In these studies the fish had nowhere to escape to, because they were living in captivity. The results in a river might be different, and would likely be more detrimental to fish and fishing. Effects will be magnified in the upper Chattooga River, which is not wide in most places. Fish will not be able to escape by moving laterally, and obstructions prevent upstream movement in many areas; downstream flight is expected, with no guarantee that the fish can return to their former position.

In a wild setting, fish experiencing continued disturbances will leave the disturbed area or hide to avoid what they perceive as a threat. Fish leaving a particular stretch of the river reduces their catchability in that area and ultimately has a negative impact on the fishing opportunity. Where there are physical barriers to fish passage in the upstream direction, scaring fish into flight may substantially reduce fish availability in a formerly productive fishing area. It is not difficult to envision fish being chased from pools into riffles or rapids that may limit their return. At the very least, boating will result in energy expenditures by fish not conducive to maintaining high quality fish condition. Thus angling satisfaction may be affected both by fish availability and condition.

Shadows and movement from humans and boats will startle fish and cause them to seek shelter away from the disturbance area. Ingram and Odum (1941) reported that pumpkinseed (*Lepomis gibbosus*) exhibited a flight response when a human shadow was reflected over the nest. This general response of fish to human presence is common in most species. Healthy salmonids will rapidly swim away from overhead shadows or from a hand waved slowly over a tank (White 2000). The increased overhead shadows and paddles breaking the surface of the water will translate to increased flight and fright responses by the fish inhabiting the river, even without considering the noise aspect. As with noise impacts, the narrowness of the upper Chattooga in many areas will maximize the impact of passing boat shadows

An additional concern is the conflict over habitat between humans and fish. Boaters will seek out deeper runs and pool areas for easier passage, rest breaks and possibly other recreational use (e.g., swimming). The impact of human activity in these important fish refugia will force fish to leave the area or hide at the first sign of any disturbance. The response of fish to most human activities is fright (Lassee 1995). The result of fright response is increased oxygen demand, disruption of internal balance and ultimately death if the stress is not removed (Lassee 1995). It seems unlikely that actual fish deaths will occur from boating use of the river, but the potential for added stress is noted. Clearly, increased boating disturbances will only result in deleterious affects to the fish community; no benefits accrue to the fish.

Beyond impacts on fish availability and condition, boating effects on angling are well known and require no special studies to elucidate. Fishermen do not enjoy having boats pass through their fishing locations any more than boaters would enjoy getting hooked by a fisherman's cast. The many pools at the base of small waterfalls constitute prime fishing areas, and would be the landing areas for watercraft coming over those falls; in addition to effects on fishing success, angler safety is a legitimate concern. The upper Chattooga River has been managed for fishing activities for over three decades and is fished over a very wide range of flows. The USFS must consider the established expectations of fishermen and the impact boating would have on the recreational experience now offered on the upper river.

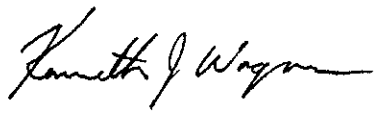
Conclusion

The authors of the Phase I study have inadequately assessed fishability as it relates to the upper Chattooga River. One of three areas was not assessed, and an additional 5.3 mile section was only fished for 45 minutes. The hydrology of the area is insufficiently understood and no accurate conversion has been developed between the gage locations, making the flow ranges applied to impressions from the fishing and boating panels unreliable. Uncontrollable variability in flow over the target river reach is high, has not been characterized in this study, and affects conclusions on fishability and boatability. Existing real data from an upstream outing club may offer decades of fishability information that has not been considered. Key factors in fishability have been ignored, including additional access potential, adaptation to varying flow conditions, interference by boating, fish community features, and non-fishing aspects of a fishing trip. Any conclusion that the upper Chattooga River should be considered

boatable based on a single trip by expert kayakers and a perception that there is no significant overlap with fishing activity should be rejected.

I would be happy to discuss any aspect of this review or provide additional information upon request.

Sincerely yours,



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